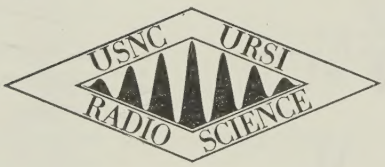
RADIO SCIENCE

Journal of the United States National Committee

International Union of Radio Science

Published by the American Geophysical Union



Volume 4

January through December 1969

Library of Congress Catalogue Number 66-60176

PROCEEDINGS OF COLLOQUIUM ON SPECTRA OF METEOROLOGICAL VARIABLES

STOCKHOLM, JUNE 9–19, 1969

Sponsored by the Inter-Union Commission on Radio-Meteorology
and the Swedish National Committee of the
International Union of Radio Science.

Contents

Foreword. J. A. Saxton 1099

Experimental studies of atmospheric structure and spectra

Spectra of atmospheric variables in the boundary layer (Review paper). Hans A. Panofsky 1101

Some aspects of the fine structure of elevated layers in the troposphere (Review paper). J. A. Lane 1111

Empirical studies of atmospheric structure and spectra in the free atmosphere (Review paper). Nikolay K. Vinnichenko and John A. Dutton .. 1115

The high-frequency fluctuation of the wind in the first kilometer of the atmosphere. C. J. Readings and D. R. Rayment 1127

Structure of vertical wind profiles. Elmar R. Reiter 1133

An energy budget for a layer of stratospheric CAT. John A. Dutton 1137

The spectrum of temperature. Hans A. Panofsky 1143

Measurement of momentum and heat flux variations in the surface boundary layer. J. C. Kaimal 1147

Comparison of barium fluoride humidity element with the microwave refractometer for studies of rapid fluctuations of atmospheric humidity. B. R. Bean and R. O. Gilmer 1155

Spectral interdependence of the radio refractivity and water vapor in the atmosphere. B. R. Bean and C. B. Emmanuel 1159

Turbulence spectra in a stably stratified boundary layer. Erich J. Plate and S. P. Arya 1163

Turbulent fluctuations of humidity and their measurement. M. Coantic and D. Leducq 1169

Microstructure of temperature fields in the free atmosphere. L. R. Tsvang 1175

Atmospheric fine-scale structure deduced from wave propagation experiments

Atmospheric structure and radar backscattering in clear air (Review paper). Hans Ottersten ... 1179

Atmospheric structure deduced from forward-scatter wave propagation experiments (Review paper). Dag T. Gjessing 1195

A review of line-of-sight propagation studies of the small-scale structure of the atmosphere (Review paper). R. W. Lee 1211

Troposcatter signal characteristics simulated by random layered scatterer arrays. W. P. Birkemeier, A. B. Fontaine, I. H. Gerks, and R. D. Pittle 1225

Homogeneity of the tropospheric refractive-index structure. Jan A. Børresen and Dag T. Gjessing 1235

Note on the observation of small-scale atmospheric turbulence by Doppler radar techniques. Roger M. Lhermitte 1241

Mean vertical gradient of potential refractive index in turbulent mixing and radar detection of CAT. Hans Ottersten 1247

Radar backscattering from the turbulent clear atmosphere. Hans Ottersten 1251

Investigations of the turbulence in convective atmosphere using radar and aircraft. A. A. Chernikov, Yu V. Mel'nichuk, N. Z. Pinus, S. M. Shmeter, and N. K. Vinnichenko 1257

High resolution tropospheric radar sounding. Juergen H. Richter 1261

Fluid-dynamical aspects of turbulence and waves

Turbulence and waves in a stratified atmosphere (Review paper). R. W. Stewart 1269

Waves and turbulence in stably stratified fluids (Review paper). F. P. Bretherton 1279

On Richardson's number as a criterion for laminar-turbulent-laminar transition in the ocean and atmosphere. J. D. Woods 1289
Billow mechanics. R. S. Scorer 1299
Measurements on the growth of small disturbances in a stratified shear layer. R. S. Scotti and G. M. Corcos 1309
Spectra of internal waves and turbulence in stratified fluids, 1, General discussion and indications from measurements in stably stratified atmosphere and ocean. Yih-Ho Pao 1315
Spectra of internal waves and turbulence in stratified fluids, 2, Experiments on the breaking of internal waves in a two-fluid system. J. Michael Hall and Yih-Ho Pao 1321
Experiments on the stability of stratified shear flows. S. A. Thorpe 1327
A modified hypothesis on turbulence spectra in the buoyancy subrange of stably stratified shear flow. J.-T. Lin, S. Panchev, and J. E. Cermak .. 1333
Nonlinear 'explosive' instabilities: Do they exist in the atmosphere? H. Wilhelmsson 1339
A self-similar view of atmospheric turbulence. John A. Dutton and Dennis G. Deaven 1341
Spectra of anisotropic turbulence in the atmosphere. Janusz Borkowski 1351

Reports of working groups

Intermittency of small-scale structure. J. A. Dutton and J. A. Lane (*Co-Editors*), B. R. Bean, C. E. Coulman, M. Fukushima, A. Montgomery, and W. C. Swinbank 1357
The spectral gap. F. P. Bretherton (*Editor*), G. Bull, R. S. Lindzen, Yih-Ho Pao, E. R. Reiter, and H. Wilhelmsson 1361
Fossil turbulence. J. D. Woods (*Editor*), V. Högström, P. Misme, H. Ottersten, and O. M. Phillips 1365
Anisotropy of the fine structure. J. C. Kaimal (*Editor*), J. Borkowski, S. Panchev, D. T. Gjessing, and L. Hasse 1369
Boundary between laminar and turbulent flow. S. A. Thorpe (*Editor*), J. Strohbehn, W. P. Birkemeier, E. J. Plate, and R. S. Scorer 1371
Waves and turbulence. N. E. Busch (*Editor*), N. K. Vinnichenko, A. T. Waterman, Jr., C. Beard, R. W. Stewart, and R. S. Scotti 1377
Heat, moisture, and momentum fluxes in the boundary layer. C. J. Readings (*Editor*), J. Businger, M. Coantic, A. R. Mahoney, and K. Naito 1381
Budgets of turbulent fluctuations. Hans A. Panofsky (*Editor*), D. Atlas, L. Fehlhaber, and J. E. Cermak 1385